

MANUAL OF THE STRUCTURE AND BRIDGE DIVISION

PART 1

PREFACE – MANUAL OVERVIEW AND USE



**VIRGINIA DEPARTMENT OF
TRANSPORTATION**

VDOT GOVERNANCE DOCUMENT

**VDOT Manual of the Structure and Bridge Division: Part 01: Preface –
Manual Overview and Use**

OWNING DIVISION: Structure and Bridge

DATE OF ISSUANCE: 04/30/2021

PART 1
PREFACE – MANUAL OVERVIEW AND USE
TABLE OF CONTENTS

FILE NO.	TITLE	DATE
TABLE OF CONTENTS – PREFACE		
Pre.TOC-1	Table of Contents	30Apr2020

MANUAL OVERVIEW

Pre.01-1	General Information	30Apr2020
Pre.01-2	Manual Structure and Release Letters	30Apr2021
Pre.01-3	Part 2 and Support / Help	30Oct2014

DESIGN EXCEPTIONS / DESIGN WAIVERS / DESIGN APPROVALS

Pre.02-1	General Design Exception / Waiver/Approval Information and Design Exceptions	30Apr2021
Pre.02-2	Design Exceptions	30Apr2020
Pre.02-3	Design Exceptions and Waivers/Approvals	30Apr2019
Pre.02-4	Design Waivers and Design Approvals	30Apr2019
Pre.02-5	Design Waivers and Design Approvals	27Jul2017
Pre.02-6	Design Waivers and Design Approvals	30Apr2021
Pre.02-7	Design Waivers and Design Approvals	27Jul2017
Pre.02-8	Design Waivers and Design Approvals	30Oct2020
Pre.02-9	Design Waivers and Design Approvals	27Jul2017
Pre.02-10	Summary Table	30Oct2020



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

1401 EAST BROAD STREET
RICHMOND, 23219-2000

Stephen Brich
COMMISSIONER

April 30, 2021

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED: None

NEW ISSUE: None

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.01-2	Deleted references to voided Part 11
Pre.02-1	Clarified design exception/waiver/approval submittal requirements for Concessionaires or Design-Builders.
Pre.02-6	Delegated approvals to District Bridge Engineers for the following items related to climate change and sea level rise: increased rainfall intensity, discharge and mean high tide values.
Pre.02-6	Added category related to ancillary structures corresponding to new Chapter 31

RETAIN THIS MEMO IN FRONT OF INDEX TO PART 1

/original signed/
Junyi Meng, P.E.
Assistant State Structure and Bridge Engineer

For: Kendal R. Walus, P.E.
State Structure and Bridge Engineer



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October 30, 2020

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED: None

NEW ISSUE: None

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.02-1	Added paragraph describing requirements related to design exceptions/waivers/approvals for Concessionaires or Design-Builders.
Pre.02-6	Clarified a waiver category
Pre.02-6	Added language pertaining to approvals required for modifications to S&B standard sheets initiated by Concessionaires or Design-Builders.
Pre.02-8	Updated summary table to reflect changes described above.

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1401 EAST BROAD STREET
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April 30, 2020

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED: None

NEW ISSUE: None

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.TOC-1	Revised dates.
Pre.01-1	Clarified that “shall” denotes a requirement.
Pre.02-2	Established that design exceptions for bridges not owned and maintained by VDOT are the responsibility of the owner. Clarified requirements for upgrading parapets/railings on widening projects.
Pre.02-6	Updated list of design waiver categories requiring approval of the State Structure and Bridge Engineer.
Pre.02-8	Clarified wording related to explanation of minor modification.

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Stephen Brich
COMMISSIONER

February 14, 2020

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED:

None

NEW ISSUE:

None

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.TOC-1	Revised dates.
Pre.02-6	Updated list of design waiver categories requiring approval of the State Structure and Bridge Engineer.

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State Structure and Bridge Engineer



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1401 EAST BROAD STREET
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Stephen Brich
COMMISSIONER

April 30, 2019

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED:

None

NEW ISSUE:

None

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.TOC-1	Revised dates.
Pre.02-4	Clarified two cases where designer is not required to submit a design waiver and required documentation to Stage 1 report.
Pre.02-10	Provided reference to File No. Pre.02-4 for exception.

RETAIN THIS MEMO IN FRONT OF INDEX TO PART 1

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COMMONWEALTH of VIRGINIA

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1401 EAST BROAD STREET
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Stephen Brich
COMMISSIONER

May 03, 2018

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED:

None

NEW ISSUE:

None

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.TOC-1	Revised dates.
Pre.02-6	Added bullet for long spans exceeding the limits specified in current IIM-S&B-80 to design waiver categories list.

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1401 EAST BROAD STREET
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Stephen Brich
COMMISSIONER

January 30, 2018

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED:

None

NEW ISSUE:

None

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.TOC-1	Revised dates.
Pre.01-2	Updated Part 5 title.
Pre.02-4	Added reference to Bridge Only definition.
Pre.02-6	Revised bullet for A1010 steel to designate A709 Grade 50CR. Removed inverted-T from bullet on non-VDOT approved sections.
Pre.02-8	Clarified waiver/approval intent related to non-VDOT sections/ shapes under third bullet of modifications not considered minor.

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For: Kendal R. Walus, P.E.
State Structure and Bridge Engineer



COMMONWEALTH of VIRGINIA

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1401 EAST BROAD STREET
RICHMOND, 23219-2000

Charles A. Kilpatrick, P.E.
COMMISSIONER

July 27, 2017

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED:

None

NEW ISSUE:

None

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.TOC-1	Revised dates and added additional sheets.
Pre.02-1 thru -8	Updated number of sheets and, where applicable, sheet numbers.
Pre.01-1	Updated File No. references.
Pre.02-1	Updated File No. reference.
Pre.02-2	Revised first bullet of items identified by the State Structure and Bridge Engineer requiring a design exception.
Pre.02-3	Removed bicycle facility content from Design Exceptions. Updated File No. references. Revised first paragraph of Design Waivers and Design Approvals.
Pre.02-4 and -5	Restructured design geometric content. Added content covering structures on new or reconstructed alignments and Bridge Only replacement projects where designers are not required to submit a design waiver expanding content to an additional page. Updated File No. references.

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.02-6 and -7	Moved content from previous sheet 5. Added use of A1010 steel and steel box (tub) girders to design waiver categories. Clarified fracture critical requirement is for truss structures and steel straddle bent use does not require a design waiver expanding content to an additional page.
Pre.02-8	Moved content from previous sheet 6, updated File No. references and final bullet in list of modifications not considered minor.
Pre.02-9	Moved content from previous sheet 7.
Pre.02-10	Moved content from previous sheet 8, updated File No. references and removed bicycle facility content from design exceptions.

RETAIN THIS MEMO IN FRONT OF INDEX TO PART 1

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For: Kendal R. Walus, P.E.
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COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

1401 EAST BROAD STREET
RICHMOND, 23219-2000

Charles A. Kilpatrick, P.E.
COMMISSIONER

December 28, 2016

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED:

None

NEW ISSUE:

None

REVISIONS:

File Number

Description of change(s)

Pre.TOC-1

Revised dates.

Pre.02-2

Added “except for bridge projects maintained by a Local Public Agency (LPA)” to the State Structure and Bridge Engineer has identified the following items as requiring a design exception.

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/original signed/
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For: Kendal R. Walus, P.E.
State Structure and Bridge Engineer



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
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Charles A. Kilpatrick, P.E.
COMMISSIONER

August 17, 2016

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED:

None

NEW ISSUE:

None

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.TOC-1	Revised dates.
Pre.02-1 and -2	Revised design exception content per FHWA policy revision and to coincide with current joint IIM-LD-227 / IIM-S&B-70.
Pre.02-3	Revised pedestrian and/or bicycle facilities design exception content to only indicate bicycle facilities, add reference to VDOT's <i>Road Design Manual</i> and match IIM language.
Pre.02-4	Revised pedestrian and/or bicycle facilities design waiver content to add reference to VDOT's <i>Road Design Manual</i> and match IIM language.
Pre.02-8	Made corresponding changes to pedestrian and/or bicycle facilities design exception and design waiver content in summary table.

RETAIN THIS MEMO IN FRONT OF INDEX TO VOLUME V – PART 1

/original signed/
Prasad Nallapaneni, P.E.
Assistant State Structure and Bridge Engineer

For: Kendal R. Walus, P.E.
State Structure and Bridge Engineer



COMMONWEALTH of VIRGINIA

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Charles A. Kilpatrick, P.E.
COMMISSIONER

May 18, 2016

SUBJECT: Manual of the Structure and Bridge Division – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

VOIDED:

None

NEW ISSUE:

None

REVISIONS:

<u>File Number</u>	<u>Description of change(s)</u>
Pre.TOC, Pre.01 and Pre.02	Removed “VOL. V” from all footer File No. blocks. Changed last revised dates only on sheets where other content was changed.
Pre.TOC-1	Revised dates.
Pre.01-1	Added first paragraph on manual references.
Pre.01-2	Removed Volume V reference.
Pre.02-3	Updated approval authority for design exceptions for pedestrian and/or bicycle facilities. Updated requirements for Local Public Agency as design criteria are not affected by funding source.
Pre.02-4	Updated approval authority for design waivers for pedestrian and/or bicycle facilities.
Pre.02-5	Updated miscellaneous language in bullets 10, 15 and 17.
Pre.02-8	Made corresponding changes to approval authorities for pedestrian and/or bicycle facilities in summary table.

RETAIN THIS MEMO IN FRONT OF INDEX TO VOLUME V – PART 1

/original signed/
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For: Kendal R. Walus, P.E.
State Structure and Bridge Engineer



COMMONWEALTH of VIRGINIA

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Charles A. Kilpatrick, P.E.
COMMISSIONER

October 30, 2014

SUBJECT: Manual of the Structure and Bridge Division
Volume V – Part 1
Preface – Manual Overview and Use

MEMORANDUM

TO: Holders of Manual

NEW ISSUE:

Manual of the Structure and Bridge Division, Volume V – Part 1 – Preface – Manual Overview and Use provides information on the structure and content of this manual, defines terms and references used throughout this manual and contains Structure and Bridge Division update requirements when changes are made to this manual. A comprehensive section on design exception, design waiver and design approval requirements is included covering approval authority, form use and specific policies for deviation from design geometrics, VDOT Structure and Bridge practices and specific requirements and modifications to VDOT Structure and Bridge standard sheets.

RETAIN THIS MEMO IN FRONT OF INDEX TO VOLUME V – PART 1

/original signed/
Prasad Nallapaneni, P.E.
Assistant State Structure and Bridge Engineer

For: Kendal R. Walus, P.E.
State Structure and Bridge Engineer

GENERAL INFORMATION:

References to VDOT's *Manual of the Structure and Bridge Division* and *Manual of the Structure and Bridge Division, Volume V*, are synonymous. In the past, this manual included other volumes that have been voided, absorbed or converted to other formats. "Volume V" is in the process of being removed internally within the manual and from outside references.

VDOT's *Manual of the Structure and Bridge Division* is divided into several parts that establish the practices and specific requirements of the Structure and Bridge Division and/or provide standards for use in bridge plans. The practices and specific requirements contained in this manual have been established based on the Structure and Bridge Division's experience, industry standards, recommendations and technological advancements made over the years.

Where details, requirements or other content appear to conflict between sections, chapters and/or parts of this manual or with other Structure and Bridge Guides, Instructional and Informational Memoranda, etc., the Designer should contact the Engineering Services Program Area of the Structure and Bridge Division to determine the intent. Designers shall be required to revise designs, details, etc. where assumptions have been made that are contrary to the actual intent.

The term "shall" denotes a requirement in the Manual of the Structure and Bridge Division. VDOT Structure and Bridge Division interprets terms in AASHTO documents such as "should", "recommended", "desired" and "preferred" as indicating the design standards to be used except where specifically shown in this manual. Lesser standards than those required in this manual should only be sought where allowed by AASHTO and where project needs justify their use. Use of such lesser standards requires submittal of a design waiver to the appropriate approval authority except where specifically authorized in this manual. See Part 1, File No. Pre.02-10 of this manual for design exception/ waiver approval authority summary.

References to "AASHTO LRFD specifications" in this manual refer to the current AASHTO *LRFD Bridge Design Specifications*, current Interims and VDOT Modifications (current IIM-S&B-80). References to "AASHTO standard specifications" refer to the AASHTO *Standard Specifications for Highway Bridges*, 16th Edition, 1996, including the 1997 and 1998 Interims and VDOT Modifications.

Users of this manual will adhere to the practices and requirements stated herein. See File Nos. Pre.02-1 thru -10 of this manual for design exception/waiver/approval information.

"CURRENT" DEFINITION AND UPDATE REQUIREMENTS:

"Current," as used in this manual, indicates the adopted version of manuals, specifications, guidelines, etc. by VDOT (design documents) at the time of the preliminary plan approval.

All projects with approved preliminary plans that have not entered the detailed design phase shall be updated to current design documents prior to proceeding.

For projects in detailed or final design phase when changes to design documents occur, the District Structure and Bridge Engineer shall determine whether updating to the newly adopted version is feasible based on possible impacts to the project.

Where changes to bridge design geometrics occur during the detailed or final design phase and the decision is made not to update to the new geometrics, a design exception/waiver is required.

For projects delayed after the Pre-Advertisement Conference (PAC) meeting, when changes to design documents occur, the District Structure and Bridge Engineer, in consultation with other Divisions, shall determine whether updates are warranted.

PREFACE – MANUAL OVERVIEW AND USE MANUAL OVERVIEW GENERAL INFORMATION

PART 1
DATE: 30Apr2020
SHEET 1 of 3
FILE NO. Pre.01-1

MANUAL STRUCTURE:

VDOT's *Manual of the Structure and Bridge Division* consists of the following Parts:

- Part 1, Preface – Manual Overview and Use
- Part 2, Design Aids – Typical Details
- Part 3, Current Details
- Part 4, Prestressed Concrete Beam Standards
- Part 5, Prestressed Concrete Adjacent Member Standards
- Part 6, Cast-In-Place Concrete Slab Spans
- Part 7, Steel Plate Girder Standards
- Part 8, Steel Beam with Timber Deck Superstructure Standards
- Part 12, Sound Walls – Architectural Treatment

Part 1 consists of individual sections providing a manual overview, design exception/waiver/ approval information and other general information regarding the manual and its use.

Part 2 consists of individual chapters each covering a particular topical area. See next sheet for additional information.

Part 3 includes standards sheets and Notes to Designer for approach slabs, bearings, joints, parapets, rails and barriers, fencing details, utilities (gas and water lines, lighting and telephone conduits), etc.

Parts 4 through 8 and 12 contain standard sheets and Notes to Designer pertaining to the areas indicated by their titles.

Notes to Designer in Parts 3 thru 8 and 12 specify use and required information to be completed on each of the standard sheets. Chapters in Part 2 that currently do not contain information are denoted as "Under Development."

The standards, details, and design aids included in this manual are provided for informational purposes only. VDOT does not warranty any of the information contained therein. It is the responsibility of the designer/engineer to perform their due diligence to ensure that the designs, details, calculations are adequate/appropriate for the specific design with the applicable specifications.

RELEASE LETTERS (MEMORANDA):

After the Table of Contents for each part of VDOT's *Manual of the Structure and Bridge Division*, all the release letters (memoranda) are compiled sequentially with the most recent date appearing in the front. These release letters contain a listing of all voided, new issue and revised sheets. For revisions, a description of changes is included for each File Number.

PART 2, DESIGN AIDS – TYPICAL DETAILS:

Design Aids – Typical Details, typically referred to as “the Office Practice”:

- establishes the specific requirements, practices and/or guidelines of the Structure and Bridge Division for design, detailing and use of specific components;
- establishes the practices for geometric layout of bridges including face-to-face of curb/rail widths, vertical and horizontal clearances, etc.;
- establishes the practices for general drafting provisions for the development of plans;
- establishes the practices for the completion of specific sheets for a plan assembly;
- provides design aids and sample calculations where appropriate;
- provides cross references to other sections, chapters and parts of this manual and other VDOT references.

The practices and requirements are intended to supplement and/or clarify the requirements of the AASHTO LRFD and/or AASHTO standard specifications and to provide additional information to assist the designer. In the event of discrepancies between the practices and the requirements set forth herein and those contained in the AASHTO LRFD and/or AASHTO standard specifications, the more stringent requirement shall govern.

Each developed chapter of Part 2 contains an Introduction. Where a recent release involves a change to past practice including new requirements, those items can be highlighted in the Introduction to raise general awareness. After an appropriate interval, these changes are removed from the list and/or replaced by more recent changes to past practices. To check when these changes occurred, the associated sheet dates can be reviewed followed by the release letters to confirm. Sheet dates are updated each time an update is made and indicates the last time the sheet was revised or issued.

SUPPORT / HELP:

This manual may be found on the Internet at:

<http://www.virginiadot.org/business/bridge-manuals-default.asp>

All parts of the manual are in PDF format. Microstation DGN files are included as attachments to the PDF files for Part 3 thru Part 8 and Part 12. Users of this manual shall check the website regularly for updates.

Refer to the website for individual contact information for specific portions of this manual and other documents maintained by the Structure and Bridge Division. Questions/comments may also be forwarded to the Structure and Bridge Division Engineering Services Program Area using the following email address: SBEngineeringservices@vdot.virginia.gov.

GENERAL DESIGN EXCEPTION / DESIGN WAIVER / DESIGN APPROVAL INFORMATION:

Design geometrics, structural design and other requirements that do not meet AASHTO or VDOT practices and specific requirements will require a design exception, design waiver or design approval. Known Design Exceptions/Waivers/Approvals (DEWA) shall be obtained prior to preliminary design approval. Designers and contractors shall not assume DEWAs will be approved.

The users of this manual are expected to adhere to the General Drafting Procedures provided in Chapter 1 of Part 2 and specific drafting requirements in successive chapters of Part 2. Where VDOT review comments indicate non-conformance to these procedures and requirements, the Designer is required to adhere and shall update the plans prior to final submission.

Concessionaire or Design-Builder shall submit all design exceptions/waivers/approvals to the State Structure and Bridge Engineer or his/her designee for approval. The Concessionaire or Design-Builder must use form LD-440 for Design Exceptions and forms LD-448 or SB-109 for design waivers. The inclusion of DEWAs in the Stage I plans cannot be used as an approval mechanism by Concessionaire or Design-Builders. DEWAs will be reviewed and either accepted, rejected or returned with comments. For the submittals returned with comments, Concessionaire or Design-Builder shall make appropriate changes and resubmit for further review. All changes shall be fully integrated into the submittals. Submission of any document containing mark-ups, comments, etc. will not be approved. Project information shall be complete and accurate and the subject of the DEWA shall be clearly stated. Any acronyms shall be defined before they are used.

Concessionaire/Design-Builder shall not submit any proposal containing DEWAs unless such DEWAs have been approved by the Department during the procurement process. Also, Concessionaire/Design-Builder shall not submit any new DEWAs in the final design for the project unless such DEWAs have been approved by the Department.

Any structures built without Structure and Bridge Division involvement that do not meet AASHTO or VDOT practices and specific requirements will not be accepted into VDOT's system for maintenance.

Approval authority for design exceptions, design waivers and design approvals shall be as noted in this manual, Instructional and Informational Memoranda or other VDOT publication and summarized on File No. Pre.02-10.

DESIGN EXCEPTIONS:

The FHWA has updated its 1985 policy regarding controlling criteria for design, applicable to projects on the NHS, thus reducing the number of controlling criteria from 13 to 10, and to apply only 2 of those criteria to low speed roadways.

Although all exceptions from accepted standards and policies need to be justified and documented, the FHWA has established 10 controlling criteria for high speed design. All 10 controlling criteria apply to high-speed roadways on the NHS (i.e., Interstate highways, other freeways and roadways with design speed \geq 50 mph). The FHWA requires a Design Exception whenever the following controlling criteria are not met:

- Design speed
- Lane width
- Shoulder width
- Design loading
- structural capacity
- Horizontal curve radius
- Maximum grade
- Stopping sight distance
- Cross slope
- Superelevation rate
- Vertical clearance

DESIGN EXCEPTIONS (cont'd.):

On low-speed roadways (i.e., non-freeways with design speed < 50 mph) on the NHS, only the following two controlling criteria apply:

- Design loading structural capacity
- Design speed

The FHWA's Virginia Division Office has established access control along the Interstate as the 11th controlling criterion.

In light of the FHWA's policy change, VDOT is reestablishing its policy that a Design Exception shall be required whenever any of the 11 controlling criteria are not met, as well as when any minimum design criteria located in the most recent version of the AASHTO publications listed below are not met regardless of design speed, functional class or whether the roadway is NHS or non-NHS:

- AASHTO's *A Policy on Geometric Design of Highways and Streets*
- AASHTO's *A Policy on Design Standards – Interstate System*
- AASHTO's *Roadside Design Guide*
- AASHTO's *LRFD Bridge Design Specifications* (including Interim specifications adopted by VDOT)

In addition, the State Structure and Bridge Engineer (SBE) has identified the following items as requiring a design exception except for bridge projects maintained by a Local Public Agency:

- Modifications to VDOT parapet/rail standards except as indicated in Part 2, Chapter 5 of this manual, or as indicated in the Notes to Designer for the standard;
- Proposed new crash-tested parapets/rails (other than VDOT).

Design exceptions shall be requested for all structures or bridges on the Interstate, Primary and Secondary Systems that do not meet AASHTO minimum design standards. For structures or bridges not owned and maintained by VDOT, design exceptions are the responsibility of and shall be submitted to the owner (city, locality, etc.) of the structure.

Design exceptions for design loading structural capacity, vertical clearance (on or under) and shoulder width (where the roadway shoulders meet AASHTO minimums, but the bridge shoulder(s) do not) are typically prepared by the bridge designer and submitted to the State Structure and Bridge Engineer through the District Structure and Bridge Engineer.

Where bridge approach work is involved (road plans may or may not be developed), early coordination between the road designer and bridge designer is required.

Design exceptions for roadway geometrics approved by the State Location and Design Engineer do not necessarily indicate that the bridge geometrics are automatically approved by the State Structure and Bridge Engineer. Present and future costs for bridge widening, sight distance, etc. will need to be considered. Normally, the roadway designer's and bridge designer's request will be transmitted separately.

For bridge widening projects, parapets / railings on the side of the bridge that is being widened are required to meet the current standards and criteria. Parapets / railings that are not on the side of the bridge being widened are not required to be brought up to the current standards.

PREFACE – MANUAL OVERVIEW AND USE DESIGN EXCEPTIONS / WAIVERS / APPROVALS DESIGN EXCEPTIONS

PART 1
DATE: 30Apr2020
SHEET 2 of 10
FILE NO. Pre.02-2

DESIGN EXCEPTIONS (cont'd.):

The policy for design exceptions as outlined in the current IIM-LD-227 / IIM-S&B-70 shall be followed. As noted in the joint IIM, design exception requests should have:

- Adequate justification regardless of the funding source;
- Mitigation measures to minimize effects of deviation including future improvements;
- Accident analysis;
- Estimate of the cost to attain full standards to determine safety benefits.

Form LD-440 shall be used and submitted as follows:

To: State Structure and Bridge Engineer

From: District Structure and Bridge Engineer (or Designee)

Submitted by: The responsible person for sealing and signing (See current IIM-S&B-79)

Recommended for Submission to C.O. by: District Structure and Bridge Engineer

Recommended for Approval by: Assistant State Structure and Bridge Engineer for the appropriate Program Area

For all Interstate structures, structures over Interstates and selected Federal Oversight projects, approval from the FHWA will also be required except for design exceptions for parapet/rail. The approval request will be forwarded to the FHWA once the SBE approves the design exception. This process will be handled by the individual submitting the request.

All approved design exceptions shall be noted on the title sheet (sheet 1) of the plans above the GENERAL NOTES. See Part 2, File No. 02.07-1, of this manual for more information.

DESIGN WAIVERS AND DESIGN APPROVALS:

When the design geometrics, structural design or other requirements meet or exceed AASHTO minimums, but do not meet the VDOT practices and specific requirements noted in this manual and/or Instructional and Informational Memoranda, the designer is required to submit a design waiver or design approval except for bridge projects maintained by a Local Public Agency (LPA) or as noted in the Design geometrics subsection.

Bridge projects maintained by the LPA are to be designed in accordance with AASHTO LRFD Specifications, current edition. See Locally Administered Projects (LAP) Manual for information.

VDOT Structure and Bridge design waiver policy is broken down into the following subsections:

- Design geometrics (Form LD-448 required);
- VDOT Structure and Bridge Division practices and specific requirements (Form SB109 or emailed approval required);
- Modifications to VDOT Structure and Bridge Division standard sheets (may require emailed approval).

The approval authority and appropriate form (either Form LD-448 or SB109) for a design waiver shall be as indicated in each subsection and summarized on File No. Pre.02-10.

PREFACE – MANUAL OVERVIEW AND USE DESIGN EXCEPTIONS / WAIVERS / APPROVALS DESIGN EXCEPTIONS

PART 1
DATE: 30Apr2019
SHEET 3 of 10
FILE NO. Pre.02-3

DESIGN WAIVERS AND DESIGN APPROVALS (cont'd.):

Design geometrics:

Use of Very Low-Volume (design year ADT ≤ 400) standards require design approval from the DBE by email documented to the project file or by approval of the Stage 1 report for preliminary approval where utilized on a project.

Use of RRR standards, adhering to the requirements in or referenced in Note O on File No. 06.01-4 of Part 2 of this manual, do not require a design waiver.

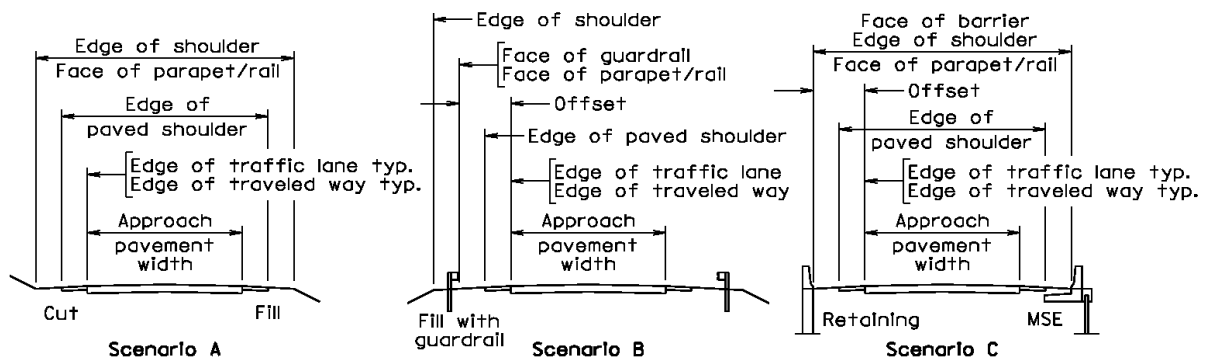
When the design geometrics meet or exceed the AASHTO *A Policy on Geometric Design of Highways and Streets* or other AASHTO minimums, but are less than the geometrics noted in Part 2, Chapter 6, of this manual, the designer is not required to submit a design waiver when documented in the Stage 1 report for preliminary approval for the following two cases:

Case 1: Structures on new and reconstructed alignments (i.e., joint road and bridge project) when the bridge width:

1. Matches the approach roadway width where a design waiver has been approved by the District Location and Design Engineer.
2. Does not create issues with site distance or drainage on the bridge.

To match the approach roadway width, the face of bridge parapet/rail shall align with:

- a) the edge of total roadway shoulder (graded and paved) or
- b) the face of guardrail or
- c) the barrier offset from edge of traveled way to face of guardrail identified in VDOT's current Road and Bridge Standard GR-MGS-INS (paved plus additional width) where roadway approaches utilize retaining or MSE walls.



Case 2: Structures on Bridge Only replacement projects as defined on File No. 06.08-1 of Part 2 of this manual when the bridge width:

Is determined following the policies and procedures addressed in the current IIM-LD-235 (Context Sensitive Solutions) and the current IIM-LD-255 (Practical Design Flexibility in the project development process) utilizing the "design up" approach looking at meeting the project's purpose, need/scope and budget.

As an example, for a Secondary Road (Rural Local Road) Bridge Only project with ADT > 2000 and length > 100 feet where the minimum AASHTO shoulder width is 3 feet, the existing approach roadway shoulder width is 4 feet and the VDOT geometric shoulder is 8 feet, matching the existing roadway shoulder width of 4 feet can be considered by the project team and stakeholders.

DESIGN WAIVERS AND DESIGN APPROVALS (cont'd.):

Design Geometrics (cont'd):

Design waivers are not required when design geometrics exceed those noted in Chapter 6. The following cases are examples of where increases in design geometrics are warranted:

- Increased bridge width due to minimum number of lanes and/or lane width to be maintained during staged construction;
- Increased bridge width for precast voided slab / box beam bridges to use standard width box shapes;
- Increased bridge width for horizontal sight distance;
- Increased bridge width to simplify the design and/or construction for structures with flat curve geometrics (i.e., straight in lieu of curved alignment on bridge).

For all other cases when the design geometrics meet or exceed the AASHTO *A Policy on Geometric Design of Highways and Streets* or other AASHTO minimums, but are less than the geometrics noted in Part 2, Chapter 6, of this manual, the designer is required to submit a design waiver.

All geometric design waivers for vertical clearance require approval of the State Structure and Bridge Engineer (SBE) irrespective of System or design year ADT.

All other geometric design waivers for projects on Interstate, Primary and Secondary (where design year ADT > 750) Systems require approval of the SBE. The recommendation for approval shall be by the Assistant SBE for the Design Engineering Program Area.

All other geometric design waivers for projects on the Secondary System where design year ADT ≤ 750 require approval of the District Structure and Bridge Engineer (DBE). The recommendation for approval shall be by the Assistant DBE for the Design Engineering Program Area. A copy of geometric design waivers approved by the DBE shall be forwarded to the SBE.

Form LD-448 shall be used and areas noted on the form shall be addressed. Traffic data shall include ADT, design ADT (including year), DHV, D and %T.

Pedestrian and/or bicycle facilities:

Designers are expected to adhere to the typical sections and requirements for roadways and structures with pedestrian and/or bicycle facilities found in VDOT's *Road Design Manual* and Part 2, Chapter 6, of this manual. When it is determined to use pedestrian and/or bicycle facility geometrics that do not meet the design criteria in the above mentioned manuals, a design waiver is required only from the District Location and Design Engineer.

One-lane bridges:

VDOT's general policy is not to build one-lane bridges. However, it is recognized that some conditions may warrant a one-lane bridge. New one-lane bridges, including full replacement of one-lane bridges, require a design waiver to be approved by the SBE. In addition to the normal design waiver request, a letter shall be provided from the locality or county requesting the one-lane bridge. Design waivers for new one-lane bridges can only be considered when the design year ADT is less than or equal to 400.

One-lane superstructure or deck replacement projects meeting the criteria found on File No. 06.02-15 of Part 2 of this manual do not require a design waiver.

DESIGN WAIVERS AND DESIGN APPROVALS (cont'd.):

VDOT Structure and Bridge practices and specific requirements:

Design Waiver categories:

Non-geometric design waivers for Structure and Bridge practices and specific requirements require approval of the State Structure and Bridge Engineer (SBE) using Form SB109 for the design waiver categories designated below:

- LRFD Load Modification (load modifiers, live load, etc)
- Span to depth ratio
- Deflections
- Long spans exceeding the limits specified in current IIM-S&B-80
- Fracture critical structures (including trusses and two beam/girder systems) where design year ADT is greater than 400
- Use of A709 Grade HPS 50W (except for Fracture Critical members) or HPS70W structural steel and hybrid steel girders
- Use of A709 Grade 70W structural steel on Fracture Critical elements of steel pier caps and steel box (tub) girders
- Use of A709 Grade 50CR steel
- Use of steel box (tub) girders
- Steel straddle bent use **does not** require a design waiver
- Use of post tensioning in bulb-T and AASHTO girders, pier caps and straddle bents
- Use of segmental girders
- Prestressed beam specified concrete strength $f'_c > 10$ ksi
- Prestressed beam debonding for members other than bulb-T beams
- Prestressed box beam, voided slab or inverted T-beam use outside the roadway functional classifications and/or deck/overlay requirements
- Use of non-VDOT approved or published sections/shapes (e.g., deck bulb-T, double-T and other sections not currently included in this manual)
- Research projects
- Corrosion Resistant Reinforcing (CRR) steel substitutions
- Corrosion resistant material that is not specified in this manual
- Abutment types and bridge layouts beyond the limitations set forth in the Abutment Type Selection Criteria and Selection Algorithm
- Use of conventional abutment with joint
- When the jointless philosophy cannot be achieved using the Virginia Abutment (eg., pier joint required)
- Beam/girder spacing greater than 12'-0"
- Variances from the requirements in IIM-S&B-76
- Variances from the requirements in IIM-S&B-89
- Use of sign structures and traffic signals on bridges beyond the limitations given in Chapter 31 of this Manual

DESIGN WAIVERS AND DESIGN APPROVALS (cont'd.):

Design Approvals:

Items not adhering to VDOT Structure and Bridge practices and specific requirements found in this manual, Instructional and Informational Memoranda or other VDOT publications not listed specifically above as design waivers require design approval from the District Structure and Bridge Engineer (DBE) unless the approval authority is specifically indicated otherwise. These include, but are not limited to, items where the terms “shall”, “minimum” or “maximum” are indicated or a non-conditional statement is made.

The DBE (or other approval authority where specifically indicated) can approve such items by email documented to the project file and does not require a design waiver. On projects utilizing a Stage 1 report for preliminary approval, known items requiring approval can be documented in and approved by the DBE. Forwarding a copy of design approvals, approved by the DBE, to the SBE is not required, but forwarding to Engineering Services (SBEengineering@vdot.virginia.gov) is recommended to assist identifying possible future adjustments to Structure and Bridge Division design practice.

DESIGN WAIVERS AND DESIGN APPROVALS (cont'd.):

Modifications to VDOT Structure and Bridge Standard Sheets:

In Parts 3 thru 8 of this manual, the following is noted:

If a standard sheet is modified by the designer, the letters "MOD." (without quotes) shall be added behind the standard designation in the lower left portion of the border. Completing items on the standard that are indicated in the NOTES TO DESIGNER are not considered to be modifications. Minor modifications do not require approval except for those proposed by Concessionaire or Design-Builder. See below for explanation of what is considered a minor modification.

Modifications not considered minor (as described below) require email approval by the District Structure and Bridge Engineer documented to the project design file unless a design exception is required.

Modifications are considered minor and do not require approval, except for those proposed by Concessionaire or Design-Builder, when they:

- Update the standard per specific design requirements for the particular bridge excluding parapet/railing standards (e.g., increase plate thickness, weld size, anchor bolt diameter, etc.);
- Extend the use of a standard past the authorized limits for use by performing calculations to show the standard is still valid (e.g., extend the use of a BWL, water line system, standard to a beam spacing beyond the maximum spacing indicated in the Notes to Designer for that particular standard);
- Adjust details to fit the particular geometry of a project without changing the basic concept or manner in which the standard functions (e.g., adjust bridge conduit system standard for particular abutment type, approach slab and/or sleeper pad details at end of bridge);
- Swap out particular details preferred by and authorized by the District that do not change the basic concept or manner in which the standard functions.

Modifications are **not** considered minor and require email approval by the District Structure and Bridge Engineer (the State Structure and Bridge Engineer or designee for modifications proposed by Concessionaire or Design-Builder) documented to the project design file (except when designated as a design exception) when they:

- Do not adhere to the AASHTO *LRFD Bridge Design Specifications*, or other AASHTO requirements (design exception approval required);
- Do not adhere to VDOT standard practices and specific requirements noted in this manual;
- Replace or modify the standard details beyond the minor modifications as indicated above. ;
- Alter the basic concept or manner in which the standard functions;
- Modifications to VDOT parapet/rail standards require design exception approval except as indicated in Part 2, Chapter 5 of this manual, or as indicated in the Notes to Designer for the standard.

DESIGN WAIVERS AND DESIGN APPROVALS (cont'd.):

Modifications to VDOT Structure and Bridge Standard Sheets (cont'd.):

The examples provided above cover most, but not all, criteria for determining whether a proposed modification is considered minor. When a designer is unclear whether the proposed modification is considered minor, the designer shall contact the Structure and Bridge Engineering Services Program Area for a determination using the email address below.

When a designer determines a modification to a standard may be required due to industry changes (product availability, common practice, etc.), the designer shall contact the Structure and Bridge Engineering Services Program Area to assist identifying necessary standard changes and for confirmation/ approval using the following email address:

SBEngineeringservices@vdot.virginia.gov.

Use of a VDOT Structure and Bridge standard sheet requires sealing and signing by the responsible person in addition to the existing seal and signature. Modification(s) not considered to be minor require removal of the existing seal and signature from the standard sheet and the sheet to be sealed and signed by the responsible person.

SUMMARY TABLE:

DESIGN EXCEPTIONS:			
Area	Criteria	Form	Approval Authority
All	-----	LD-440	SBE

DESIGN WAIVERS AND APPROVALS:			
Area	Criteria	Form	Approval Authority
Design Geometrics	Interstate, Primary and Secondary (where design year ADT > 750) Systems. *	LD-448	SBE
	Vertical clearance for all systems.		
	Secondary System where design year ADT ≤ 750 excluding vertical clearance. Approved LD-448 to be forwarded to SBE.*	LD-448	DBE
	Pedestrian and/or bicycle facility geometrics that do not meet the design criteria found in VDOT's <i>Road Design</i> Manual and Part 2, Chapter 6, of this manual.	LD-448	District Location and Design Engineer
VDOT Structure and Bridge Practices and/or Specific Requirements	New one-lane bridges, including full replacement of one-lane bridge, when design year ADT ≤ 400 with Locality or County letter requesting one-lane bridge	LD-448	SBE
	Categories requiring design waiver as listed in File No. Pre. 02-6	SB109	SBE
	Items requiring design approval as defined in File No. Pre.02-6 and -7 unless specified elsewhere	Email response approving item	DBE
	Items where approval authority specifically noted elsewhere	Email response approving item	As noted
Modifications to VDOT Structure and Bridge Standard Sheets	Changes not considered minor (as defined in File No. Pre.02-8)	Email response approving change	DBE
All areas listed above	All items/modifications proposed by Concessionaire or Design-Builder	LD-448 or SB 109	SBE or his/her Designee

The following acronyms are used above for approval authority:

SBE = State Structure and Bridge Engineer

DBE = District Structure and Bridge Engineer

* Except as noted in the Design geometrics subsection on File No. Pre-02-4.

**CONCRETE DECK SLAB
DECK SLAB DESIGN – LRFD
DECK SLAB DESIGN TABLE**

PART 1
DATE: 30Oct2020
SHEET 10 of 10
FILE NO. Pre.02-10